

```

In[1]:= x0 = 0;
x1 = 2.0;
Nmax = 20;
eps = 0.0001;

f[x_] := Cos[x];

If[N[f[x0] * f[x1]] > 0,
 Print["Your values do not satisfy
 the Intermediate Value Property, so change the values."],


For[i = 1, i ≤ Nmax, i++,

m = (x0 + x1)/2;

If[Abs[(x1 - x0)/2] < eps,
 Print["Root is : ", m];
Print["Estimated error in ", i, "th iteration is : ", (x1 - x0)/2];
Break[],

Print[i, "th iteration value is : ", m];
Print["Estimated error in ", i, "th iteration is : ", (x1 - x0)/2];
];

If[f[m] * f[x1] > 0,
 x1 = m,
 x0 = m
];
]
];
];

Plot[f[x], {x, -1, 3},
PlotRange → {-1, 1},
PlotStyle → {Red, Thick},
PlotLabel → "f[x] = Cos[x]",
AxesLabel → {x, f[x]}]

```

```
1th iteration value is : 1.  
Estimated error in 1th iteration is : 1.  
2th iteration value is : 1.5  
Estimated error in 2th iteration is : 0.5  
3th iteration value is : 1.75  
Estimated error in 3th iteration is : 0.25  
4th iteration value is : 1.625  
Estimated error in 4th iteration is : 0.125  
5th iteration value is : 1.5625  
Estimated error in 5th iteration is : 0.0625  
6th iteration value is : 1.59375  
Estimated error in 6th iteration is : 0.03125  
7th iteration value is : 1.57813  
Estimated error in 7th iteration is : 0.015625  
8th iteration value is : 1.57031  
Estimated error in 8th iteration is : 0.0078125  
9th iteration value is : 1.57422  
Estimated error in 9th iteration is : 0.00390625  
10th iteration value is : 1.57227  
Estimated error in 10th iteration is : 0.00195313  
11th iteration value is : 1.57129  
Estimated error in 11th iteration is : 0.000976563  
12th iteration value is : 1.5708  
Estimated error in 12th iteration is : 0.000488281  
13th iteration value is : 1.57056  
Estimated error in 13th iteration is : 0.000244141  
14th iteration value is : 1.57068  
Estimated error in 14th iteration is : 0.00012207  
Root is : 1.57074  
Estimated error in 15th iteration is : 0.0000610352
```

